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BOOK REVIEW

PASSIVE ENERGY DISSIPATION SYSTEMS IN STRUCTURAL ENGINEERING, by T. T. Soong and G. F. Dargush, Wiley, Chichester, ISBN: 0-471-96821-8, No. of pages: 356

In the past few years there has been a very rapid evolution in the application of structural control to the field of civil engineering structures. The use of new technologies for the protection of buildings and bridges from earthquakes and wind loads is now very widely accepted in many countries. In Japan at least 20 buildings have active control systems for the reduction of vibrations due to high winds, and several hundred buildings have been built or are under construction with base isolation systems for seismic protection. Currently in the United States there are many isolated buildings, both new and retrofitted, however, as yet there are no buildings using active control. A large number of buildings, however, have installed passive energy dissipation devices for improved seismic performance. The structural engineering profession has largely adopted this strategy with enthusiasm, although the standard static methods of design can no longer be used.

This monograph provides an extremely useful introduction to the dynamic analysis of structures with supplementary energy dissipation devices. Beginning with a simple exposition of the effect of energy dissipation on dynamic response and illustrated by simple examples, it provides a framework for structural design.

Each of the chapters that follow the chapter on the basic concepts describe in detail the mechanical characteristics of one type of energy dissipating device, the mathematical modelling of the device, and the integration of the device into the structural system. Dampers based on the elastic–plastic deformation of steel are covered in Chapter 3, friction dampers in Chapter 4, viscoelastic dampers in Chapter 5, and fluid viscous dampers in Chapter 6. A particularly useful part of each of these chapters is the descriptive examples of how these devices have been implemented in new or retrofit projects.

Two other chapters cover tuned mass and tuned liquid dampers, again with a good description of examples of implementation. A final chapter covers devices that are still being researched and have not yet seen implementation. These are devices based on shape memory alloys, piezo-electric materials, and electro-rheological and magneto-rheological fluids, which have interesting properties that might be the basis of controllable or semi-active dampers.

In summary, the authors have provided an excellent unification of the field of passive energy dissipation systems by bringing together a wide range of experimental results and manufacturers' data. The book will be very useful to the practicing structural engineer faced with design decisions and needing unbiased information on the characteristics and limitations of the available devices. It will also be useful to graduate students and other researchers looking for promising areas for further research.

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